US Army Corps of Engineers ®

The Corps Environment

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Sights, sounds, smells at Old Gentilly Landfill represent recovery from hurricane disaster

By MARY BETH HUDSON
Louisiana Recovery Field Office

Dragonflies are carnivorous; if you're baling for scrap metal, it's best to have a mix of appliances in the baler, not just refrigerators; and a porta-potty equals about two cubic yards. These may not be well-known facts in some circles, but they're common knowledge around the Old Gentilly Landfill in Orleans Parish. Old Gentilly is one of the many disposal sites being used by the U.S. Army Corps of Engineers as it attacks its Federal Emergency Management Agency-assigned debris removal mission in hurricane-ravaged Louisiana.

A visit to Old Gentilly is an excursion into a strange world that assaults the senses. Exit your vehicle, and dragonflies swoop and swirl around you. Large trucks rumble by with huge piles of ruined appliances swaying and bumping overhead. The roar of heavy equipment is constant, and the stench is almost unbearable. Visitors

See *Old Gentilly* on page 3

Photo by Mary Beth Hudson

These containers are full of unidentified substances collected at the EPA household hazardous waste site near the Old Gentilly Landfill. Each substance will be tested and identified before disposal.

Unwatering success, good water quality in Lake Pontchartrain

By JOYCE M. CONANT
Task Force Hope Public Affairs Office

Immediately following Hurricane Katrina's massive flooding in New Orleans Aug. 29, numerous media focused on the polluted waters, containing what they called a "toxic soup." The mix consisted of water from nearby Lake Pontchartrain, refuse from the overwhelmed sewer system in New Orleans, oil and industrial chemicals, as well as thousands of vehicles, boats and homes.

As the U.S. Army Corps of Engineers made efforts to close levee and floodwall breaches and begin pumping out the more than 224 billion gallons of water from the city, federal and state scientists monitored the flows and made recommendations to avoid environmental impacts to Lake Pontchartrain and surrounding areas.

Scientists with the U.S. Environmental Protection Agency and Louisiana Department of Environmental Quality took the lead to document and monitor the environmental effects triggered by Hurricane Katrina. Other agencies also responded with environmental expertise.

Several New Orleans District biologists were sent to various offices to assist with the response to Katrina.

Biologists Gib Owen and Bob Martinson arrived at the Emergency Operations Center in Vicksburg, Miss., shortly after the flooding in New Orleans had reached its peak. From there, Owen was able to make initial contacts with the other environmental resource agencies, while Martinson reached out to other district biologists and made arrangements for them to begin work.

Initially Mike Salyer and later Casey Rowe were placed on the Unwatering Team at the New Orleans District. They provided on-the-ground reports from the city and made environmental recommendations to the project managers on site.

"Mike Salyer and I were able to relay environmental conditions to other biologists working with DEQ (Louisiana Department of Environmental Quality) and EPA," Rowe said. He said the process allowed them to coordinate quickly and provide rapid response to environmental conditions, which changed daily and sometimes hourly.

Christopher Brantley and Laura Lee Wilkinson were embedded with the Unified Incident Management Team, run jointly by EPA and LDEQ headquarters in Baton Rouge. Their responsibilities were to enhance the flow of data to other agency personnel and submit environmental recommendations to the field personnel based on near real-time water quality data.

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The Corps Environment

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Teaming up on environmental projects

North Atlantic Division

In the 1990s, residents of the Claremont Development in Manville, N.J., reported seeing a black oil-like substance discharging from the ground on their properties. An investigation revealed the area's ground contained high levels of creosote, a preservative to treat wood and a probable human carcinogen. They were unknowingly living on the grounds of a former wood treatment facility that existed more than 50 years ago.

The Environmental Protection Agency Region 2 asked the U.S. Army Corps of Engineers' New York District to perform the remediation of this 50-acre residential and commercial development that included the prompt relocating of residents from 17 homes. At the time, the district was unable to use its real estate office and reached out to the Baltimore District whose real estate personnel joined the team.

It was this flexibility to reach out to another district for assistance that moved this project forward and quickly relocated the residents from this environmental hazard.

The Federal Creosote Superfund Site Project is one of several North Atlantic Division (NAD) projects that formed a regional team that includes the customer to successfully perform environmental missions that not only met the needs of the public, but also proved to be a win-win for the Corps and customers.

USACE 2012

Teaming up with other districts is the philosophy of USACE 2012 that is encouraging us to work more like a business and less like a hierarchical organization. Traditionally, we have worked primarily as stand alone elements. Now we are working more as regional teams

See *Teaming* on page 6

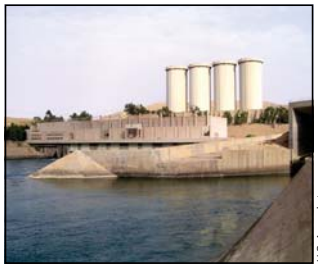
Mosul Dam Project given a green light

By CLAUDE D. McKINNEY
Gulf Region North
U.S. Army Corps of Engineers

MOSUL, Iraq — Good news. The Mosul Dam project is back on the Iraq reconstruction list. Recently $20 million for urgent needs associated with the Mosul Dam was approved.

The Mosul Dam is important to the future economic growth of northern Iraq. It provides electricity for industry growth, water for crops, flood control, and maybe even a future site for recreation.

The Mosul Dam is the first in the series of dams along the Tigris River. It impounds a lake 80 kilometers long currently holding 9 billion cubic meters of water. It has the capability to hold 11 billion cubic meters of water. The spillway has the ability to release 12,000 cubic meters of water per second, currently it releases only 3,000 cubic meters. The reason for that is the water way passing the city of Mosul, just down stream, can only handle the 3,000 cubic meters flow. If more water was to be released, the Tigris would overflow its banks and flood parts of the city. The hydro electric generators in place there produce 750 MW with a capacity to peak at 1000 MW. The dam was put in place to accomplish three goals: produce electricity, control flooding and provide water for agriculture.



U.S. Army photo

The Mosul Dam releases 3,000 cubic meters of water per second.

Because of the geologic formations the dam is sitting on, a continual drilling and grouting process of the subsurface materials is needed to keep the dam from catastrophic failure. There are only seven of the 12 available drills in operation. The others are down due to repair part shortages. The $20 million allocated will provide the needed repair parts, and possibly the acquisition of additional drills. It will also provide funding for specialized equipment to measure the up-stream water flow into the impounded reservoir.

Old Gentilly

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quickly don masks while old hands at Old Gentilly seem unfazed. "After a while, it smells like ocean breeze," says Dan Bell, an archaeologist from Sacramento District, who coordinates the quality assurance operations at the site.

There's a lot to coordinate; it's a busy place. "Have you ever stuck a stick in a fire ant nest and swirled it around?" asks Steve Wilhelms, resident engineer in New Orleans charged with household hazardous waste, white goods, and the meat removal mission. "That's what it reminds me of."

All the organized chaos that is Old Gentilly is geared to clearing Orleans Parish of the tons of debris left in the wake of the hurricanes. It's one of the places where the thousands and thousands of ruined refrigerators are temporarily taken for processing and disposal. They're off-loaded into rows where they remain long enough for EPA to remove the Freon and Corps contractors to scrape out the contents. "The aromas over here are quite remarkable," said Wilhelms in an understatement.

Photos by Mary Beth Hudson

After Freon has been removed, the contents cleaned out and the refrigerators disinfected, they are baled along with other appliances in a baler such as this. The bales are then recycled as scrap metal.

Thousands of refrigerators are hauled to Old Gentilly where they are lined up, processed and then baled for recycling. About 3,000 refrigerators a day are hauled to Old Gentilly by contractors working the FEMA-assigned debris removal mission managed by the Corps of Engineers.

After they've been processed, the refrigerators are crushed and baled with other appliances to be recycled as scrap metal. Sunday, Oct. 23, was a landmark day for the white goods mission at Old Gentilly; more than 3,000 refrigerators were handled.

In another part of the landfill, huge mounds of "C&D" (construction and demolition) debris are dumped and compacted. It's here that visitors catch startling dramatic glimpses of the lives represented in the debris, as furniture and household items mix with plywood, sheetrock and other remnants of lives changed forever by the hurricanes.

Down the road a short distance, EPA has a site set up to handle household hazardous waste. EPA and Corps contractors traverse Orleans Parish collecting the paints, pesticides, solvents, etc. — items normally stored in garages and now needing disposal. At the EPA site, it's unloaded, tested if necessary, categorized and prepared for recycling or shipping to appropriate disposal sites. The site already has handled about 100,000 containers.

Nearby, at the site for temporary storage of woody debris, a powerful tub grinder shoots chips onto a fast-growing pile. The mighty machine gobbles branches, limbs and even tree stumps as fast as a loader can feed them into the tub. The material is quickly reduced (volume about four to one) to chips that are then hauled to the landfill for disposal. A 200-foot safety radius is maintained around the grinder. "What's amazing to me is the power plant these things have working and the energy that goes into the grinding teeth," Wilhelms said.

Branches, limbs, trunks and stumps are fed into this tub grinder and reduced into chips for disposal. The reduction in volume is about four to one.

Old Gentilly is incredibly busy, and it's just one of more than 70 sites the Corps is using as it helps Louisiana recover from the largest natural disaster in the nation's history.

"We've got our own micro-environment here," says Wilhelms. He's speaking of the dragonflies, but the words ring true of the entire operation. Even novices quickly learn that dragonflies feed on fly larvae; refrigerators should only make up about 80 percent of the mix when baling; and quality assurance representatives visually judge the volume remaining in a truck bed by the size of a porta-potty.

Water

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Linda Mathies reported to MVD-Forward on the *Motor Vessel Mississippi* to check with other environmental team members and provide situational updates to Brig. Gen. Robert Crear, commander of the Mississippi Valley Division and of Task Force Hope, his staff and USACE Headquarters personnel.

One of the first items the team tackled was coordination with the U.S. Coast Guard to place sorbent and debris booms across pump discharge locations, especially in canals where flood and storm water was being pumped directly into Lake Pontchartrain. Booms, used to contain and recover spilled oil and gasoline, limited the impacts of the contamination.

At last report, the Coast Guard said more than 8 million gallons of petroleum were spilled due to Hurricane Katrina. This approaches quantities in the *Exxon Valdez*, which dumped 11 million gallons of oil into Alaskan waters. However, the Coast Guard estimates that only about 11 miles of shoreline were affected, mostly within the levee system in St. Bernard and Plaquemines parishes. Fewer than 200 animals were estimated to be affected by the spilled oil, but many were recovered, cleaned and released by Fish and Wildlife Service personnel.

The debris booms limited the amount of floating organic material and debris from entering Lake Pontchartrain as well. When this type of material begins to decompose, dissolved oxygen levels in the water decrease and can lead to fish kills. Collecting and removing floating woody debris by these booms before it entered Lake Pontchartrain was critical to maintaining satisfactory water quality in the lake.

In addition to removing oil and debris, the foul-smelling and bacteria-laden floodwater in New Orleans needed to be aerated to promote beneficial microorganism growth and to increase dissolved oxygen levels before the water entered Lake Pontchartrain. This was done to prevent harmful algae blooms or creating an anoxic "dead-zone."

The environmental team worked with the Unwatering Team to bring in more than 25 aerators to the drainage canals leading into Lake Pontchartrain. The aerators circulated the canal water, spraying it to increase dissolved oxygen in the water. Daily monitoring of the water quality at the discharge locations provided information on how many aerators were needed and where they could be most effective.

Lake Pontchartrain has experienced several large algae blooms in past years due to large inputs of nutrients during the summer months. These blooms are usually created when fresh water and large amounts of nutrients, such as nitrogen and phosphorus enter the lake from rivers, outfall canals, industrial discharges and other sources. In combination with the area's long, hot, sunny days, this can encourage an explosion of harmful algal growth.

Too much algae can throw an ecosystem out of balance and harm organisms like fish and shellfish. Algae produce oxygen during the day, but consume it at night. When the algae die, their decomposition is fueled by oxygen, further decreasing the amount of dissolved oxygen in the water. Summer days can also raise water temperatures, causing a further decrease in the amount of dissolved oxygen water can hold.

Placement of the booms and aerators helped to increase dissolved oxygen concentrations along the south shore of Lake Pontchartrain and avoid subsequent environmental impacts.

As of 45 days after Hurricane Katrina, there had been no adverse water quality impacts to the lake from the unwatering of New Orleans. No oily sheens have appeared on the lake surface and no fish kills have been observed.

Biological monitoring of the discharge canals and Lake Pontchartrain will continue for the next several weeks. EPA and LDEQ will continue to monitor the region affected by Katrina for environmental impacts. Non-scientific reports are encouraging. One commercial shrimper told Corps' monitors at the 17th Street Canal on Oct. 17 that he was catching unusually large numbers of shrimp from Lake Pontchartrain and seeing large crab harvests as well.

LDEQ observations confirmed the commercial shrimper's statement.

"Fishing in the lake is as exciting and fast-paced as ever. When we were gathering fish-tissue samples on Oct. 12, the shrimp trawl was loaded with hot-dog-bun-size shrimp and big, healthy crabs," said Rodney Mallet, LDEQ communications director. The LDEQ and the FDA were sampling in the southwestern part of Lake Pontchartrain between the Bonnet Carre Spillway and the Causeway Bridge.

For more information, call the Task Force Hope Public Affairs Office at (504) 862-1645.

Photo by Alan Dooley

New Orleans District employee Casey Rowe, right, environmental resources specialist, gives coworker Edward Wrubluski, quality assurance representative, an overview of the aerators on the 17th Street Canal. The aerators put oxygen back into the water to avoid fish kills and to keep organic matter decomposed.

On-site archaeologist ensures no damage to historical sites during hurricane cleanup

By NOLA LEYDE
Seattle District

What use is an Indiana Jones in disaster recovery?

To the U.S. Army Corps of Engineers team in Mississippi, locating a field archaeologist was a valuable find.

A huge challenge after the power and fury unleashed by Hurricane Katrina in Mississippi is where to put the millions of tons of debris created by the storm. There weren't enough dump sites available in affected counties for the thousands of truckloads of broken trees and construction debris that has to be moved from city and county roads and right of ways.

The Corps cadre that deployed in support of the National Recovery Team was experienced and ready. They had their "Indiana Jones" with them.

Jennifer Winter, field archaeologist, left, meets with Christine Craig, Corps debris crew, in the tower at the Lamar County debris reduction site, for an update on activities at the site.

Jennifer Winter, a field archaeologist with the Corps' Omaha District at Lake Oahe, volunteered to serve on the debris team. First selected as a quality assurance inspector, her background in archaeology was quickly put to work in the field.

Winter immediately conducted reviews of potential dump sites to prevent any damages that might occur to historical sites.

Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to take into account the effects of their undertakings on historic properties. This includes a broad range of activities and includes buildings, structures, sites and archaeological resources.

In coordination with the Mississippi State Historical Preservation Officer, Federal Emergency Management Agency (FEMA) Historic Preservation Office staff, environmental engineer Katie McCafferty and National Environmental Policy Act (NEPA) compliance officer Tom Chandra from Louisville District, Winter evaluates potential sites.

A visit to a proposed debris reduction site on Monroe Creek in Lamar County revealed there were no cultural resources going to be disturbed by activity at the site.

"This particular site is where two creeks meet and typically this is where you might find some pre-historic sites," Winter said. "There weren't any here. This area has undergone heavy erosion as a result of clear cutting, and is currently used as a dump site by individuals."

Looking very much like a field archaeologist, complete with a shovel, trowel and a screen for sifting, Winter surveys the heavily eroded site and stops to shovel out a test pit.

Photos by Nola Leyde

Jennifer Winter, field archaeologist, takes a soil sample at a debris site to examine for signs of use.

She slowly sifted through an area near the creeks that could have yielded some sign of past use. Plastic and a piece of roofing were all she found in the samples she took, demonstrating recent use as a dump site.

Winter emphasized that coordination and field work was a usual process that the federal team goes through, except it was on a fast track. Winter examines the sites as carefully as the tight emergency deadlines allow, but the paperwork moves faster to accommodate the millions of tons of debris that must be disposed of after the storm.

At one site in Pike County there were signs of some farming activities. Beyond that, all the sites examined so far were clear of any signs of prehistoric or historical activities.

For Winter it is an interesting challenge. At Omaha District she usually works on the plains, much different from what she has encountered in Mississippi.

"It's interesting to get to work in a different region of archaeology. The southeast's woodland environment spurs different lines of cultural development than the plains. Here in southeast Mississippi the soils aren't farming friendly, so rather than the earthlodge villages which so dominate the Missouri, most of the sites here are small camp sites of hunters and gatherers and their associated activities," Winter said.

"I have enjoyed helping out. The opportunity to work in a forested environment, and with federal and state officials in disaster recovery has been an invaluable opportunity."

Through the field work and subsequent consultation with the Mississippi historical preservation office and FEMA, the concept of a team of field archaeologists was realized. A call for four archaeologists from the Department of the Interior was answered and now three National Park Service and a U.S. Fish and Wildlife archaeologists work together with Winter to survey possible project locations.

Teaming

Continued from page 2

comprised of members from many districts, other divisions and our customers. This doesn't mean employees are being relocated to form these teams. Instead, we are working virtually through the use of various communication technologies.

North Atlantic Division

These regional teams are fully supported by Regional Business Centers that are operated by each of the Corps' eight divisions and headquarters. The North Atlantic Division's regional business center supports its six districts that include — New England District, New York District, Philadelphia District, Baltimore District, Norfolk District and Europe District.

The division has 3,926 employees who perform civil works and military missions as well as environmental, support for others and emergency response services for 62 million people in the northeast United States and 51 other countries.

The North Atlantic Division started forming regional teams even before the USACE 2012 initiative. In fact, the Federal Creosote Superfund Site Project is the first project of its size and complexity that made successful use of team members from several districts and divisions. The division continues to show that teamwork works.

Federal Creosote Superfund Site

The North Atlantic Division has the largest Superfund program in the Corps, more than 50 percent of all program funding. The Federal Creosote Superfund Site Project in Manville, N.J. is one of several large-scale superfund projects NAD's New York District has collaboratively with the EPA's Region II. The $175 million project involves the cleaning up of creosote that has contaminated the soil and groundwater of a 50-acre residential and commercial property.

U.S. Army photo

Mandeep Talwar, left, project lead engineer, and Gamal Awad watch the backfilling operation in progress.

The project delivery team includes the NAD's New York District, as lead, Philadelphia District, Baltimore District, as well as support from other districts and divisions, as well as the customer, EPA Region II.

Corps Benefits

"In the initial forming of our project delivery team we wanted to tap the expertise of the New York District Real Estate office, but they were occupied with other critical projects," said Gene Urbanik, New York District, acting N.J. Area engineer.

"We needed depth and flexibility and decided to work with other NAD districts. For instance, we were able to use the services of the Baltimore District Real Estate office, which supplied us with staff. Without this capability we wouldn't have been able to efficiently relocate area residents, which would in turn have delayed the project."

Customer Benefits

"EPA and the project delivery team created a cost tracking system to keep on top of the project's budget," said John Frisco, who manages the Superfund program for EPA Region II.

"Keeping track of our budget has become very important, especially in the last few years as the national demand for Superfund monies has exceeded the available program budget. This useful system was created successfully and promptly, in large part, due to the knowledge and expertise of the team members. The system has not only helped monitor costs at Federal Creosote, but has also served as a boilerplate for other joint EPA/Corps Superfund projects."

For more information on the NAD environmental projects mentioned in this article, please contact Joanne.castagna@usace.army.mil

Why form regional teams?

There are many benefits for both the Corps and our customers to working in regional teams because they:

- **Produce better projects** — Having the flexibility to tap the best people for the job from several districts ensures a better quality project for the customer.
- **Save money** — When you have the right people on the job, projects are produced correctly from the start and money is not wasted on correcting problems.
- **Save time** — Because our organization is working more vertically and laterally rather then hierarchically, project issues are resolved early on in the project process.
- **Improve employee skills** — Team members are exposed to the expertise of their fellow members, which enhances their own skills.
- **Share lessons learned** — Team members share lessons learned with one another that benefit present and future projects.
- **Provide support system** — Team members that temporarily leave projects, for personal or other reasons, are supported by other skilled members that can step in for them.
- **Improve customer communication** —Since customers are team members, there is improved communication with them that helps the Corps better meet their needs.
- **Sustains Core Capability** — When you have the expertise from several districts, this reduces the need to hire from the outside and keeps the work in-house.

Saint Paul District staff rubs shoulders with the national leading experts on freshwater mussels

By ELLIOTT STEFANIK, DAN KELNER, KEITH LeCLAIRE, and DENNIS ANDERSON
St. Paul District

The 4th Biennial Symposium of the Freshwater Mollusk Con servation Society (FMCS) was held this past May in St. Paul, Minn. The FMCS is a national organization devoted to advocacy for, education about, and conservation of freshwater mollusks, North America's most imperiled fauna.

The Corps is engaged in several projects related to native freshwater mussel conservation on the Upper Mississippi River (UMR). St. Paul and Rock Island District biologists are working with other federal, state and private agencies to establish five new populations of the federally endangered Higgins eye pearlymussel (*Lampsilis higginsii*).

The development of a relocation plan for the federally endangered winged mapleleaf mussel (*Quadrula fragosa*) also is under way. These two species have been, or are, at risk of substantial impacts from the exotic zebra mussel (*Dreissena polymorpha*). In support of these concerns, the Corps also monitors the health and status of native mussels and the invasive, zebra mussel, by sampling various locations of the UMR.

The FMCS dedicated two platform sessions for presenting observations and results of UMR mussel conservation and management efforts.

Presentations were made by Corps, U.S. Fish and Wildlife Service, and State biologists. Elliott Stefanik, a biologist from St. Paul District, presented the "Status of Zebra Mussel Populations (*Dreissena polymorpha*) within the Upper Mississippi River System" including observations on zebra mussel populations along 500 miles of the UMR since 2001. In summary, zebra mussel populations have been highly variable across even small spans of space and time. Populations appear heavily influenced by Lake Pepin, a large, natural lake on the UMR south of the Twin Cities metro area. Upstream of Lake Pepin zebra mussels have minimal populations, while the lake itself and downstream areas have substantial populations. Although data suggests a recent decline in zebra mussels on some areas of the river, it's too early to tell if zebra mussel populations will crash and remain at low levels, or rebound to levels that continue to adversely affect native mussels.

Photo courtesy of MNDNR

St. Paul District biologist Dan Kelner, right, and Bernard Sietman of Minnesota Department of Natural Resources sort through young Higgins Eye mussels during 2003.

Photo courtesy of St. Paul District

Zebra mussels impact native mussels, such as this Higgins Eye, through massive colonization on exposed surfaces.

Dan Kelner, another Corps biologist, presented "Reintroduction Activities of the Upper Mississippi River Mussel Coordination Team to Conserve the Federally Endangered Higgins Eye Pearlymussel (*Lampsilis higginsii*)." This focused on activities to establish Higgins eye pearlymussels in areas of the UMR with lower zebra mussel infestation levels. Recent activities have included relocating adult mussels and artificial propagation and "stocking" of juvenile mussels. To date nearly 500 adult Higgins eye have been relocated from heavily infested zebra mussel waters to areas of the UMR above Lake Pepin. Approximately 10,000 juvenile Higgins eye have been artificially propagated, of which nearly 8,000 already have been reintroduced to the UMR. Additional experiments also have been performed to artificially propagate four UMR tributaries, though the success of these efforts is currently unknown. Reintroduction efforts will continue through at least 2008 followed by monitoring and augmentation of the populations as needed.

Keith LeClaire, the St. Paul District GIS coordinator, presented "Development of a Freshwater Mussel Database." Because of the vast amount of mussel data being collected as part of the interagency mussel conservation effort, there is a strong need to develop a standardized geospatial database for storing survey and relocation data. The adopted Web-based approach offers several advantages over other stand-alone data management approaches. It provides increased data integrity, sophisticated relationships, database check in/out tools and a simplified user interface. The standardized data structure will enhance data collaboration, reduce costs on customized query tools, streamline reporting functions and facilitate system-wide project planning and resource modeling. The Corps Engineer Research and Development Center's Remote Sensing/GIS Center of Expertise in Hanover, N.H., is developing the Oracle 10g database and Web application. Because of all the national mussel propagation and relocation efforts, the FMCS plans on developing a national relocation database and has agreed to work with St. Paul District on our database development.

For more information visit http://ellipse.inhs.uiuc.edu/FMCS/.





Photos by Kent Baldwin, U.S. Army Corps of Engineers

The Avtex Fibers boiler house is part of a massive three-building complex that includes the power house and compressor room.

After the boiler house implosion, the remaining two smaller buildings will be demolished using conventional track hoe methods.

Corps implodes Virginia's Avtex Fibers boiler house

Event marks milestone in cleanup of historic former industrial site

By JERRY ROGERS
Norfolk District

One could feel the drumbeat of anticipation in the air Sept. 19, as more than 500 anxious community members gathered behind the former Avtex Administration Building on Kendrick Lane in Front Royal, Va. Many had come to Virginia's largest Superfund cleanup site to see the massive eight-story, 120-foot tall Avtex Fibers boiler house reduced to rubble. Others, who for decades had worked at the Avtex plant, came to pay their last respects to a bygone era and to the historic former industrial complex that enabled them to provide a comfortable life for their families and educate their children. All of them came to celebrate the rebirth of Avtex into *Royal Phoenix*.

Following a ceremony to honor the old Avtex community of Front Royal and herald the town's new *Royal Phoenix* redevelopment project, at exactly 3 p.m. the U.S. Army Corps of Engineers Norfolk District gave the implosion signal. Belching a great gray cloud as it tumbled into a huge pile of steel and rubble, the largest remaining structure on the 440-acre EPA Superfund site proved no match for 150 pounds of carefully laid explosives.

The successful implosion of the Avtex boiler house marked a five-year historic milestone in the Corps' mission to address environmental contamination at the site, located along the South Fork of the Shenandoah River in the scenic foothills of the Blue Ridge Mountains. The boiler house demolition ushered in the beginning of the site's redevelopment as *Royal Phoenix*, a 165-acre technology-oriented business park, 240-acre nature conservancy park and 35-acre multi-field community soccer complex.

The Executive Director of the Front Royal-Warren County Economic Development Authority, Paul J. Carroll, explained that the redevelopment focus will be on innovative technology and hospitality as its core uses.

"Our plan shows that the site can accommodate nearly 1 million square feet of office and flexible technology buildings to support the innovative technologies in manufacturing," Carroll said. "Also, our plan calls for several tourism-related activities, such as an outdoor recreation specialty retailer; a 200-room hotel and conference center; a culinary and wine institute; and even an artisan center and other educational venues."

The *Royal Phoenix* vision began to take root after Avtex Fibers was declared an EPA Superfund site in 1986. Chicago-based FMC Corporation, which owned the industrial complex from 1963 to 1976, is performing overall site cleanup activities, under the supervision of the Environmental Protection Agency and the Virginia Department of Environmental Quality. The last company that owned the site, Avtex Fibers Inc., went bankrupt after the plant closed in 1989.

In 2000, the Corps was given the mission to address environmental hazards, which are separate from the EPA Superfund site cleanup efforts, under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). Corps congressional funding totaling $23 million involved a four-phase non-CERCLA cleanup process: site management planning; asbestos abatement; buildings demolition; and debris removal and recycling. Funding for the Corps cleanup mission was spearheaded by Senator John W. Warner (R-VA) and Congressman Frank Wolf (R-VA-10th).

"This is a great day for Warren County," said Wolf in his pre-implosion ceremony remarks. "The people of Warren County have been waiting for this clean-up work to be completed, and now, finally, the last buildings of the Avtex site are coming down."

Norfolk District Commander Col. Yvonne J. Prettyman-Beck focused her ceremony remarks on the success enjoyed by the multi-agency partnership that worked so hard and so well together. "Now well into the Corps' final clean-up phase," she said, "reaching this significant project milestone is a testament to our combined team spirit and shared goal to safely and efficiently restore this site for future development and ecological use."

For 50 years, the Avtex site's boiler house provided all of the heat and power for the entire site, home of the largest facility ever built for the production of rayon fiber, also known as artificial silk. It generated enough electricity to power a city of 300,000 people, and used enough coal to heat 45,000 homes.

President Franklin D. Roosevelt and British Prime Minister Winston Churchill collaborated with a British-owned viscose company to build the plant. The plant created materials which were vital for the Allies during World War II, especially rayon cord used to strengthen all types of tires. Because of its many contributions to the war effort, in 2001 the plant was designated a historic property. The Front Royal operation once employed more than 3,000 people from all over the northern Shenandoah Valley region, and later produced rayon used in apparel, home furnishings, carpeting — and even carbonizable rayon for NASA's Space Shuttle program.

"Nothing could have been done with this facility," said Norfolk District Project Manager Al Opstal. "It stood empty for 10 years before anyone ever attempted to start doing something.

"It was just a huge eyesore. People coming over the Skyline Drive would stop and look down over the small town of Front Royal, and they'd see this huge industrial complex that's not doing anything, that's decaying, full of asbestos. And now we're about to see it all gone, ready for new development. It's a very good feeling to have been able to contribute to that effort, he said."

During its decontamination, demolition and cleanup mission, the Corps also partnered with the Virginia Department of Historic Resources and the Shenandoah Center for Heritage and the Environment. The Corps provided the agencies with thorough photographic documentation of the historic buildings being removed, and supported the retrieval and preservation of historically significant items discovered during cleanup. As a value-added benefit of that partnership, the Corps and the Shenandoah Center recovered more than $100,000 worth of reusable laboratory glassware which was donated to the Warren County Public Schools' science labs.

To better understand the scale of the Avtex Fibers industrial site and the complex mission the Corps was given, to date the project delivery team has decontaminated and demolished 49 site structures and removed or recycled the following:

- 188 tractor-trailer loads of asbestos-contaminated materials;
- 16 drums of material containing polychlorinated biphenyl (PCBs);
- Six 55-gallon drums of waste containing mercury;
- 550 truckloads of discarded building equipment, furnishings and other debris;
- 800 truckloads of steel and other metals disposed of as recycled material for melting and reuse;
- 200,000 cubic yards of crushed concrete, stone and brick for beneficial reuse on site (sub-base material for site roadways); and
- 17,800 gallons of recovered oil for recycle.

"The former Avtex Fibers operation is one of the largest and most significant Superfund sites now being readied for redevelopment," said Donald S. Welsh, Regional EPA administrator for the Mid-Atlantic States. "The reclamation of this site and the cooperation of the public and private sectors set the stage for a timely redevelopment that reflects the future in business opportunities, open green space and quality of life for Virginia, Warren County and Front Royal."

Front Royal Mayor James Eastham proudly summed up the feelings of his community: "When our town's biggest employer and taxpayer closed down in 1989, that devastating blow could have crushed our community spirit forever. But instead it united us. It strengthened our resolve. Over the past 16 years our community leaders, both town and county, have never wavered from this resolve. Our goal, has been to take this liability and turn it back into an asset."

> ***'The former Avtex Fibers operation is one of the largest and most significant Superfund sites now being readied for redevelopment.'***
> — Donald S. Welsh

Photo by Steve Clark

Looking downstream at a location about 1,500 feet downstream of the dam shows the wide and shallow channel before improvements.

St. Paul District, Wisconsin Department of Natural Resources partner in habitat restoration

By STEVE CLARK
St. Paul District

A Corps of Engineers' reservoir and channel improvement project on the Eau Galle River in west-central Wisconsin protects the village of Spring Valley from floodwaters. However, the project has had adverse impacts on the river, a designated trout stream.

Records indicate this river once supported a self-sustaining coldwater fish community, including native brook trout. Survey work in the Eau Galle River has shown a decrease in this fish community during the past 15 years. The Wisconsin Department of Natural Resources (WDNR) believes the decrease in trout abundance is related to elevated stream temperatures and deteriorated habitat conditions on the river and that this decline is probably caused by the flood control project and land-use practices in the watershed.

Temperature monitoring by the WDNR documented stream temperatures downstream of the dam frequently above the sustained upper lethal temperatures for brook and brown trout, around 78 degrees. Some factors potentially contributing to this problem included the release of warmer surface waters from the reservoir, impoundment of water behind a sheet-pile weir and a lack of overhead vegetation. In addition to the elevated temperatures, the channel portion of the Eau Galle River lacked habitat diversity and structure.

The WDNR and local conservation groups were concerned about the future of the Eau Galle River and began exploring measures to restore it to a healthy coldwater trout fishery. These concerns led to a collaborative effort between the St. Paul District and the WNDR. The first phase of this effort, conducted in 2000, included a study of the influence of subsurface releases on downstream water temperatures.

Through summer 2000, the Corps released the majority of the discharge through a subsurface outlet, where colder reservoir water was present.

Prior to this, much of the water was released from a surface outlet, where water temperatures approach air temperatures. During subsequent investigations, the Corps and WDNR have not detected water temperatures above the sustained lethal limit for trout. Furthermore, contrary to early concerns, the subsurface release has not had negative effects on the water quality of the recreationally-important reservoir.

Even though it seemed like much of the concern over elevated water temperatures had been relieved, temperatures were still higher than preferred. Furthermore, improvement in the habitat structure in the channel portion of the Eau Galle River was obviously needed.

During construction of the flood control project, the Corps installed a 2,300-foot-long channel in the Eau Galle River below the dam to efficiently pass flood flows. A sheet-pile weir was installed about 1,000 feet downstream of the dam to aid in stream gauging. The wide channel resulted in slow and shallow water and a muddy bottom, all contributing to increased heating by the sun. The weir impounded a 1,000-foot long pool, further slowing the water and compounding the problem.

To alleviate these problems, under the authority of Section 1135 of the Water Resources Development Act of 1986, the district and WDNR began constructing a habitat restoration project. In August 2003, the sheet-pile weir was removed and replaced with a low rock weir 400 feet downstream of the dam to decrease the length and depth of the pool. This change decreased the residence time of the water and, consequentially, reduced warming from the sun.

Also, a narrow and deeper low-flow channel was constructed in the bottom of the flood channel downstream of the new weir. The new channel was constructed with

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Sub-committees seek to leverage eCoP assets

By CANDICE WALTERS
Headquarters Public Affairs

The four Environmental Community of Practice Steering Committee Sub-Committees are providing a framework for accomplishing the overall principles of the Environmental Community of Practice.

"We're using these sub-committees to leverage our technical capabilities, to maintain a world-class work force, enhance and encourage learning, and to provide the latest in tools and technologies to ensure our teams throughout the Corps continue their great work," said Ken Gregg, chairman of the Environmental Community of Practice Steering Committee.

The four sub-committees are the Steering Committee Charter and Structure; Web Enhancements; Integration of the Environmental Operating Principles, and the Capable Workforce/Learning Organization.

Don Ohnstad, chief, Program Support Branch, Hazardous, Toxic and Radioactive Center of Expertise in Omaha, is leading the Capable Workforce/Learning Organization subcommittee. The group has created a functional statement that spells out its responsibility as "advising the eCoP on developing the tools necessary to build and maintain capacity with the Corps to carry out our environmental mission."

To that end, the group is investigating three general areas: the inventory phase, capable work force phase and learning organization phase, or as Ohnstad stated it another way, "What do we have? What do we need? How are we going to get there?"

In answering "What do we have?," the team is investigating and evaluating subject matter expert database types and planning to recommend developing one type for the Environmental Remediation and Environmental Enhancements disciplines.

For the Capable Workforce, or "What do we need?," Ohnstad said the goal is to ask each division, district, lab and center to use a Capable Workforce tool to assess their Environmental Remediation and Environmental Enhancements work force and project human resource needs for five years later.

Under the third objective, the focus is on enhancing capability building within the Corps by putting an increased focus on career development plans. "Using the career development plan information and the Capable Workforce information, individual employees and their supervisors would develop meaningful individual development plans and organizational training needs plans," he said. "These training needs would be used to ensure the Corps is developing in-house or contracted course material."

Dr. Patrick Deliman, chief, Environmental Engineering Branch, U.S. Army Engineering Research and Development Center, Vicksburg, Miss., who heads up the Integration of the Environmental Operating Principles sub-committee, said his group is working on getting senior leadership more involved in implementing the EOPs.

"We're also looking at EOP training opportunities, looking at courses to see where the principles could be applied. Our sense is that there is a lot of interest in implementing the principles, but people just don't know how to include them. So we're looking at some existing courses into which we could incorporate EOP training," he said.

The Environmental Operating Principles are supposed to be part of our culture already, so they shouldn't be new to people, he added.

It's a process of incorpor-ating them into everything we do, and we're on the road to accomplishing that, he said.

"One of our other initiatives is to resurrect our environmental awards program, most specifically the Lt. Gen. Frederick J. Clarke Award for Leadership in Environmental Sustainability.

"We want to give it more visibility, and make it a more prestigious award," he said.

Deliman said the Corps is at a point now where it's time to revitalize the principles. If they are not being implemented, we need to find out why not, what the impediments are, he said.

When the EOP project management plan was created, Senior Executive Service champions were identified, but as Deliman pointed out, many of them have retired so it's time to identify new ones and put a greater focus on the EOPs.

One way of doing that is to check out similar efforts in other agencies and non-governmental organizations with whom the Corps partners to see where successes can be documented and shared, he said.

Mark Seebeck, environmental program manager for the South Pacific Division Regional Integration Team, heads up the team looking at enhancing the Engineering Knowledge Online eCoP portal.

"We've been asked to recommend three tiers of changes — short term (next six months), mid term (12 months) and long term (out in the future)," Seebeck said.

Because the portal does not have public access, the team is looking into what changes are needed so portions could be used by external members.

Earlier this fall, Seebeck gave a presentation on the portal to Formerly Used Defense Sites program managers to familiarize them with the portal so they can access it for FUDS program information and other Corps environmental information.

"We're really trying to get people to understand that the portal is a one-stop shop for all kinds of environmental information for the Corps, and to get people use it as their home page," Seebeck said.

Greg Jordan, an environmental engineer within the Program Integration Division of Military Programs, is heading up the five-person eCoP charter revision team, looking for ways to integrate senior leadership from both the Civil Works and Military Program directorates into the eCoP. "Once the charter revision is completed, we will have dual signatures from Civil Works and Military Programs executives on the charter and have dual distributions from the directors of Civil Works and Military Programs," he said.

"We see the charter revision as a tool to try to increase the scope, visibility and awareness of the Environmental Community of Practice. It will help raise awareness, promote the eCoP and result in more participation in the eCoP along with visits to the Web site, which has lots of good information that can be used throughout the Corps," Jordan said.

'Green exhibit' highlights Corps capabilities

By CANDICE WALTERS
Headquarters Public Affairs

What would you expect from an exhibit named "The Corps Role in Keeping the Environment in the Solution"? A little green around the edges of the exhibit, perhaps?

Well, at least at the very minimum. But the folks at Jacksonville District and South Atlantic Division wanted to send an even stronger message to visitors to the Corps' exhibit at the Florida Brownfields Conference earlier this year.

After the National Brownfields Conference two years ago, "we knew we needed an exhibit that portrayed a broader Corps message," said Doris Marlin, senior project manager, Interagency and International Services Branch, Jacksonville District.

"We wanted a 'green exhibit' that highlighted our Corps capabilities and displayed our credentials as an agency supporting sustainability. After all, the concept of sustainability is central to our Brownfields mission," she said.

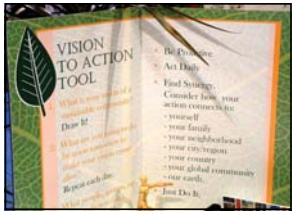
Thus, the "green exhibit" came into being, incorporating the Vision-to-Action tool used by the Corps at previous Brownfields conventions.

The Vision to Action concept encourages people to visualize what they value about their community and how they would like to improve it, and then translate that visualization into actions that are synergized and leveraged with actions of other people within their communities with complimentary ideas. Artists work with participants to put their visions on paper so they can take them back to their community groups, talk them over, build upon them and then put them into action.

For the exhibit to work, it was necessary to make it something that would not only attract people, but make them feel comfortable.

"We designed it with the intention of making it friendly, warm, something that would draw people in, make them want to come in and stay for awhile, to converse and talk about what's important for their communities," Marlin said.

And the design worked well enough that the Headquarters Brownfields program staff decided that it should be the Corps exhibit



at the National Brownfields Conference, Nov. 2 through 4, in Denver. It appeared to be a good decision, judging by the number of people who not only stopped to look, but came in and sat down for awhile to share ideas and create a vision of what a sustainable community should be.

"We used bamboo, which is definitely long-lasting and sustainable; live plants, a critical part of the environment; a water element that keeps us connected to water resources; sustainable lights handmade out of paper made of cotton and hemp, bamboo and beeswax; rubber mats made out of shredded car tires, and our foamboard framework that is being reused, recovered and used over and over," Marlin said.

"It all works together and gives us an engaging space that draws people in," she said.

That's not to say that there won't be changes to the exhibit, after all, it's still a work in progress, Marlin said. As part of the Vision to Action program, participants are given artist renderings of their visions. Marlin said the Brownfields team had hoped to use 100 percent recycled paper for those printouts, but some technical difficulties prevented that at the Denver conference, something she said would be corrected before the exhibit goes on the road again.

"We needed more of a forum for how sustainability, and visioning, fits in with Brownfield projects and the Corps, and we think this exhibit gives us that," she said.

Photos by Jane Mengler

Artists Brian Borrello, left, and Mark Lakeman, right, work with people sharing their visions of how to make their communities sustainable in the "green" Corps exhibit at the National Brownfields Conference in Denver. James Waddell, xxxx, rear, talks with another visitor to the exhibit about the Vision to Action concept. The exhibit was designed using as many sustainable and "green" components as possible, including bamboo, green plants, and foamboards that are being recovered and reused.

Savannah District provides technical expertise to EPA Brownfields Program

By STEVEN BATH
Savannah District

Savannah District serves as one of two hazardous, toxic and radioactive waste (HTRW) Design Districts for the U.S. Army Corps of Engineers, South Atlantic Division (SAD).

Since the mid 1980s, the district has been using its in-house drill crews and sampling teams to conduct environmental site assessments on military bases and formerly used defense sites (FUDS) throughout the eastern United States.

With equipment ranging from standard drill rigs to a track mounted Geoprobe® direct push rig and a Site Characterization and Analysis Penetrometer System (SCAPS) vehicle, the district has the capability to conduct a wide variety of Phase II Site Assessments. These range from the installation of standard monitoring wells to implementing the Corps and EPAs TRIAD approach.

Using this extensive expertise, Savannah District has been able to assist EPA with the Targeted Brownfield Assessment (TBA) Program. Brownfields are old commercial and industrial properties that are perceived to contain hazardous substances, pollutants or contaminants but because of this risk of contamination, financial investment in the property is limited or non-existent.

Savannah District has conducted Targeted Brownfield Assessments from Miami, Fla., to Kannapolis, N.C. Sites investigated have ranged from metal finishing facilities to cotton mills and to historic power plants. District personnel are involved in every aspect of the assessment from meeting with the sponsor and developing the objectives of the project to speaking at public meetings, developing the Quality Assurance Project Plan (QAPP), conducting the field work and preparing the final report.

Based on the previously prepared QAPP for the Jekyll Island TBA, EPA Region 4 requested that Savannah District prepare a QAPP Guidance Document for use throughout the region. The intent of the document was to provide new Brownfield grantees the guidance needed to successfully develop a QAPP for Brownfield site assessments or cleanups.

A QAPP is "a formal document describing in comprehensive detail the necessary quality assurance (QA) and quality control (QC), and other technical activities that should be implemented to ensure that the results of the work performed will satisfy the stated performance criteria."

The guidance document serves as a guide and provides examples of the types of information EPA Region 4 expects to see in a QAPP. The document does not serve as a substitute for other EPA guidance. It includes links to Web pages providing additional EPA guidance documents that should be consulted in preparing a QAPP. The guidance document also provides links to the Web pages providing environmental regulations for each of the state regulatory programs within Region 4.

Photo by Steven Bath

A Corps drill rig set up for monitoring well installation sits outside the Social Circle Cotton Mill, Social Circle, Ga.

The QAPP Guidance Document is prepared in the format of a QAPP. It provides standard wording that can be left as is for a new QAPP being prepared by the grantee. It also provides sample wording that may or may not be appropriate to the site specific situations for the grantee's new QAPP document being developed. It provides example wording and guidance for both Assessment QAPPs and site cleanup QAPPs. As different sections of the QAPP are covered, information is provided that is intended to guide the user but not intended to become a direct part of the finished QAPP document.

The major focus of the guidance document is the development of the project data quality objectives (DQOs). The DQOs are critical to the success of the assessment or cleanup. DQOs are qualitative and quantitative statements that clarify project objectives, define the appropriate type of data, and specify acceptable levels of decision errors to ensure the quality and quantity of data support the project decisions. New grantees often do not understand DQOs nor do they know how to approach the problem of selecting data quality objectives. The guidance document discusses a team approach to DQO development involving project managers, technical leaders (engineers, geologists and chemists), regulators and stakeholders.

Through the DQO process, the relevant technical experts are encouraged to participate in the project planning process to specify their particular needs prior to the data collection process.

Savannah District continues to use its technical expertise to support EPA through Five-Year Reviews of Superfund Sites, development of scopes and cost estimates for Superfund sites and review of Brownfield Site Assessment QAPPs.

"The Quality Assurance Project Plan (QAPP) Guidance Document for Brownfields Site Assessments and/or Cleanups" will soon be available on the EPA Region 4 Web site.

Measuring groundwater flow, containment

Efficient approach determines nature, extent of TCE in a bedrock aquifer

By ROBERT LEITCH and DREW CLEMENS
New England District

What do the Cold War of the 1950s and 1960s and the safety of today's drinking water have in common? The answer lies in the current scientific understanding that small concentrations of chlorinated solvents possess high levels of toxicity.

During the 1950s and 1960s, the U.S. Department of Defense was responsible for the protection of the East Coast from communist missile invasion and the execution of an offensive missile attack. The highly specialized radar systems were susceptible to oxidation, corrosion and electrical shorts due to oils used on the equipment. Chlorinated solvents performed an excellent job in cleaning the electronics. In particular, trichloroethylene (TCE) performed a superior job in this cleaning effort and it didn't take very much to clean the equipment. Unfortunately, today it doesn't take much TCE to contaminate groundwater to a level that is unsafe to drink. In addition, the toxicity value of TCE was appreciated so much that it was occasionally used as a defoliant to eradicate unwanted weeds or woody vegetation at the DoD facilities. The government did nothing

See *TCE* on page 16

New data review guidance: USACE Engineer Manual 200-1-10

Guidance for the review of chemical data, USACE Engineer Manual (EM) 200-1-10 (30 June 2005), "Guidance for Evaluating Performance Based Chemical Data," has been finalized and is now available at the following Web link: http://www.usace.army.mil/inet/usace-docs/eng-manuals/cemp.htm.

The production of data of "known and acceptable quality" is a primary goal of every environmental restoration and compliance sampling and analysis activity. Some degree of data review is necessary to ensure that only scientifically defensible data are used to support project decisions.

The extent and nature of data review will be dependent upon the project's data quality objectives (DQOs), that is, qualitative and quantitative statements which specify the quality of data required to support the decision making process. This primarily constitutes the underlying philosophy of a performance-based measurement system (PBMS); data review criteria are established from project-specific objectives and data end use.

However, until now, performance-based data evaluation protocols have not been available. Existing data validation protocols primarily consist of the USEPA National Function Guidelines for Inorganic and Organic Data Review or USEPA regional variations of these documents, which predominately apply to only Contract Laboratory Program (CLP) analytical methods and primarily utilize evaluation criteria based on the fixed contractual requirements in the CLP Statement of Work. Typically, these contractually based data evaluation protocols cannot be directly applied to other methodologies such as SW-846 chemical methods, which predominately are used for USACE projects. Since CLP evaluation protocols are based upon fixed contractual specifications, they do not necessarily take project-specific objectives into account. Meeting these requirements will not necessarily produce usable data. Data evaluation strategies that are based upon fixed contractual specifications that do not address analytical error in a holistic manner with respect to project objectives are often of limited value since they often result in either the over or under estimation of actual data quality.

EM 200-1-10 presents guidance for more effectively evaluating data in the context of its end use. The guidance assumes that data evaluation will be predominately performed with respect to the measurement quality objectives established in the Quality Assurance Project Plan (QAPP). Thus, data evaluation is driven by project-specific data quality objectives rather than contractual or method-based criteria. The effectiveness of the data evaluation strategies will be limited by the appropriateness of the quality objectives in the QAPP. The document presents data qualification strategies when measurement quality objectives in the QAPP are not met. Non-compliant data are either reported as "estimated and tentatively accepted," "estimated and tentatively rejected," or as "rejected." The data qualifiers are applied on the basis of the magnitude of the non-compliance, the direction of bias, and the level at which contamination is being monitored. Data quality is always evaluated in the context of any project-specific decision limits (e.g., cleanup goals or risk-based levels). The document also specifies data reporting requirements since the extent of any review will be limited by the physical contents of the data package.

Although the data evaluation strategies presented in EM 200-1-10 do not constitute full data "validation" (i.e., a review of all quality control elements to the level of the raw data), it is anticipated that they will result in a relatively thorough evaluation of data quality that will be more appropriate for many environmental projects relative to evaluation protocols based predominately upon the acceptance criteria in published standard methods or fixed contracts. The engineer manual can potentially be used to evaluate chemical data from any instrumental method, regardless of the determinative or preparatory techniques used to process the environmental samples. Questions regarding the technical content of EM 200-1-10 can be referred to Dr. Thomas Georgian, CENWO-HX-C (402-697-2567, thomas.georgian@usace.army.mil).

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wrong, for it followed standard waste disposal practices when using TCE, but society didn't understand health implications of contaminants in our drinking water at that time.

Now 40-50 years later, we are trying to recover the TCE discharged at these facilities via sub-surface septic systems, waste disposal sites, floor drains and/or stormwater collection systems. Complicating this effort is the fact that these facilities were constructed on the highest topographic features to gain the most direct and unobstructed radio and radar signals. The geology of these locations in New England is typically fractured metamorphic and igneous rock. This rock is typically referred to as "hard rock" and it is generally a solid media with small fractures or fissures making up the porosity. This geology makes our job of determining groundwater and contaminant flow very difficult.

The following discusses the geophysical techniques employed at the Glenburn and Bucks Harbor, Maine DERP FUDS projects.

Both the Glenburn and Bucks Harbor, Maine DERP FUDS have TCE contamination in the bedrock aquifer. Initially, fracture trace studies were performed by the USACE Topographic Engineering Center to locate the surficial expressions of the local fractures and the general regional orientations. A surface geophysics study was performed by the U.S. Department of Energy's Argonne National Laboratory geophysics team at specific areas either on or along the fractures migrating through the contaminant source areas.

The results of these studies at the Bucks Harbor site allowed monitoring wells to be located along bedrock aquifer flowpaths.

At this point, the project team understood the bedrock fracture system in plan view. The next and more complicated step was to determine the depth to the individual fractures and fracture zones at each well. An extensive suite of borehole geophysical logging tests were performed by the U.S. Geological Survey. This suite included caliper, electric, fluid, water quality, acoustic and optical televiewer logging, vertical heat pulse flow metering (VHPFM) and downhole check shots. At this point, we knew the bedrock characteristics, the larger fracture sets, any vertical flow of groundwater in the borehole and we were able to determine which wells warranted further testing. However, we didn't know which fracture zones contained contamination or those that had groundwater flowing horizontally across the borehole (not a measurable characteristic determined by the VHPFM). These results further defined and reduced our bedrock study area.

To further define the flow zones and the respective contamination we needed highly sensitive groundwater flow measuring equipment. The hydrophysical borehole flow measuring technique was employed at both the Bucks Harbor and Glenburn sites by using the Corps-wide borehole geophysics contract (W9128F-05-D-0006) with RAS Inc. (RAS) of Golden, Colo. This equipment was able measure vertical and horizontal flow across the borehole down to one-hundredth of a gpm. Hydrophysical logging involves injecting the borehole with environmentally safe deionized water while running a high resolution multi-sensor fluid conductivity instrument throughout the entire water column.

The formation fluids will contrast electrically with the deionized water allowing for highly accurate identification of where the water is entering the wellbore, whether the ambient (or native) flow is horizontal or vertical, and quantifying the velocity or flow rate of these flows. By processing the data in near real time, decisions were made in the field regarding the vertical portion of the borehole to apply an advanced wireline straddle packer test platform.

The use of RAS for the packer testing provided the projects a definition of the vertical extent of contaminated groundwater with one mobilization. The wireline straddle packer testing provided detailed hydrogeologic evaluation and allowed high quality interval specific groundwater samples and hydraulic test data to be obtained. These methods were used to evaluate depth specific permeability and the vertical extent of contamination.

Due to the success of the hydrophysical methods employed at the site, the nature and extent of contamination has been defined with a confidence level that allows treatment options to be explored in the Feasibility Study.

For more information regarding the technical approach call Robert Leitch at (978) 318-8033 or Drew Clemens at (978) 318-8861. For information on using the Corps-wide borehole geophysics contract, contact Sam Bass, HTRW Center of Expertise, at (402) 697-2654. Specific hydrophysical logging and straddle packer information can be obtained from the RAS Web site at: http://www.rasinc.org

U.S. Army photo

The RAS company performs the hydrophysical logging task at one of the Bucks Harbor, Maine, wells.

Habitat

Continued from page 10

meanders and bank-overhang structures to provide cover and habitat diversity for trout.

The district completed the weir replacement, and the WDNR met most of its cost-share requirement by providing the construction services of a trout habitat improvement crew for the channel reconstruction.

The Corps and WDNR discovered a problem early in summer 2004. The new rock weir was constructed with a small notch to pass water during low flows. Unfortunately, some aspiring young "engineers" from Spring Valley began placing rocks in the notch to slow the flow of water. Cleaning the notch was difficult, and a solution was needed.

In late summer 2004, the Corps decided the small notch was not required for stream gauging, and the weir was reconstructed to include a large notch lined with flagstones. The district provided the rock, and the WDNR, again, provided the construction services. The new notch is as wide as the reconstructed channel below it and has not been "reconstructed" by the youth of Spring Valley since.

Photo by Steve Clark

This is the completed channel in May, the second year after construction, from approximately the same location as the pre-construction photo.

All parties involved considered the project a success. While it will take some time for the project to influence trout populations, trout have been found in the improved reach and temperatures appear to be further reduced.

The district staff involved with the project worked together through obstacles smoothly and efficiently. The partnership between the district and the WDNR was very effective, and good working relationships were developed. Furthermore, WDNR staff expressed a desire to work with the district on similar projects in the future.

Finally, conservation groups, sportsmen and the general public, the real customers, expressed appreciation for the project. Trout fishermen look forward to expanded fishing opportunities in western Wisconsin, an area that receives heavy fishing pressure from the local community and the Twin Cities area.

For more information, contact the St. Paul District Public Affairs Office at (651) 290-5200.

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